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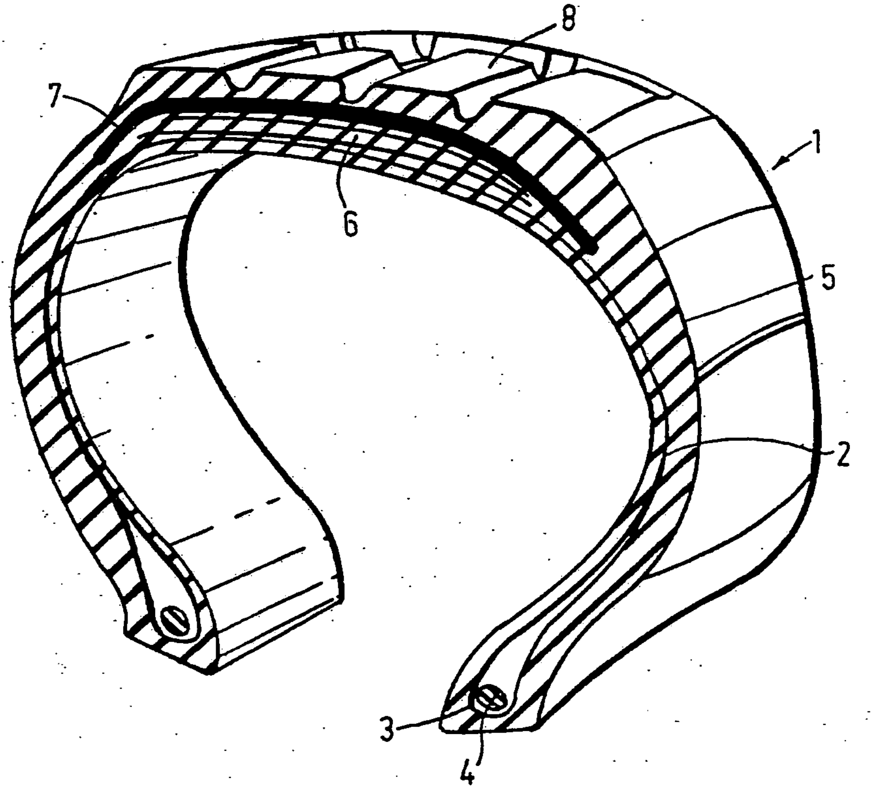
(54) A pneumatic vehicle tyre

(57) A vulcanisable rubber mixture for a material cover ply formed from reinforcing elements which shrink under heat, comprises at least 20% by weight of styrene-butadiene copolymer, with at least 30% by weight of bound styrene, and a readily adhesive elastomer and, in consequence, the mixture is extremely impermeable to gas.

The drawing(s) originally filed was (were) informal and the print here reproduced is taken from a later filed formal copy.



A PNEUMATIC VEHICLE TYRE

The invention relates to a pneumatic vehicle tyre, of a radial carcase construction, having a belt-like reinforcing insert and a material cover ply formed from cord or filament elements which are disposed in the circumferential direction, are covered with a vulcanisable rubber mixture and are shrinkable under the effect of heat.

As a general rule, pneumatic vehicle tyres are inadequately protected from outside influences, such as the penetration of air and moisture particles which pass from outside through the tread surface into the tyre as far as the steel cord belt.

The cover plies known from German Patent Specification No. 2 110 145 and German Offenlegungsschrift No. 2 853 006 are reliable means for bandaging and protecting the steel-reinforced belt, since their textile cords or filaments are formed from a material which is not hygroscopic or is only slightly hygroscopic. In addition, the formation and disposition of the warp, ventilation and identification filaments for such a cover ply as claimed in German Gebrauchsmuster (Utility Model) No. 8 108 375 constitute a further suitable means for reducing the risk of the wick effect of the filaments.

The rubber mixture for such a cover ply is suitable as an additional protective means when it is composed of components which have a satisfactory to good impermeability to gas.

The invention seeks to improve the rubber mixture to such an extent that it is itself capable of reducing or preventing the penetration of air and moisture constituents.

The technical object resides in providing a rubber mixture for the cover ply which, on the one hand, should be extremely adhesive and, on the other hand and in particular, should form a block against moisture constituents and against the penetration of air particles from outside and should prevent such air and/or moisture particles from passing to the steel cord elements of the steel-reinforced belt.

According to the invention, this object is achieved, in that the rubber mixture is formed from two components, one of which is an emulsion- or solution-polymerised styrene-butadiene copolymer (E-SBR or S-SBR) which makes up at least 20% by weight of the rubber component and which contains at least 30% by weight of bound styrene in the elastomer molecule. The other rubber component is preferably natural rubber which is extremely adhesive and, in this respect, fulfils this partial object of the invention.

The rubber mixture, which has at least 30% by weight of bound styrene in the elastomer molecule in the SBR portion, constitutes a mixture which has a good impermeability to gas and which reliably prevents the possibility of air and moisture particles from passing from outside through the tread surface as far as the steel cord belt. In conjunction with the SBR type, the additional rubber component of natural rubber ensures that the rubber has a high adhesive strength relative to the cover ply element, formed from nylon, rayon, polyester, polyamide, or aramide, in order to cover these cords or filaments, which are shrinkable under the effect of heat, in a permanent and satisfactory manner. The rubber mixture is also capable of bonding well with the adjacent tyre portions because it readily adheres to the adjacent rubber portions of the pneumatic vehicle tyre, namely the belt insert, the carcase and the tread strip, with the result that no disadvantages arise in respect of the adhesiveness in the construction stage and in the vulcanisation behaviour in connection with the durability of the finished product, and the tyre belt is permanently protected from the influences of air and/or moisture constituents because of the rubber mixture of the cover ply.

The invention is explained with reference to one embodiment which is illustrated in the drawing, in which the single Figure is a partial, cross-sectional view of a radial, belted tyre.

The radial, belted tyre 1 substantially comprises a radial carcase 2, the two tyre beads 3 which have an axial spacing therebetween and are each provided with a substantially inextensible bead core 4, the two side walls 5, the belt-like reinforcing insert 6, the cover ply 7 for the reinforcing insert, and the profiled tread strip 8.

The radial carcase 2 is formed from textile materials, the filaments of which extend substantially at 90°.

The belt insert 6 is a two-layered construction, and each layer is formed from steel-reinforced plies which substantially include steel cords of a predetermined structure, these steel cords being inclinedly orientated relative to the circumferential direction at an angle of from 12° to 24°, and the two belt plies are disposed in a crosswise manner relative to each other with respect to the cord direction. The cover ply 7 is formed from cord or filament elements which are made of nylon, for example, and which extend substantially at an angle of 0°, that is to say, substantially parallel to the central plane of the tyre. They shrink under the effect of heat and form a bandage for the tyre belt. These cover ply elements are covered with a rubber mixture of the invention which is composed of 40% by weight of natural rubber, 20% by weight of SBR 1500 and 40% by weight of SBR 1013. In this case, the SBR 1500 has a bound styrene content of 23.5%, and the SBR 1013 type of rubber has a bound styrene content of 43% by weight.

Instead of having this combination of SBR types, it is also possible to use only one or other SBR type, but then it would be used in a different percentage by weight ratio.

The rubber mixture for the cover ply has a relatively high impermeability to gas. For this reason, it is an additional, important means for protecting the steel-reinforced belt, situated radially therebeneath, from the penetration of air. The air and/or moisture particles which naturally pass from outside into a tyre, e.g. in the event of a puncture, are retained on the rubber coating of the cover ply as a result of its high impermeability to gas or are prevented from passing to the belt of the tyre for a long time. In this way, the metal cord belts are effectively protected from influences which may otherwise lead to a premature formation of rust and the subsequent corrosion thereof. Three different rubber mixtures are listed in the Table.

Composition	Standard	Type A	Type B
(100 parts by weight per 100 parts by weight of rubber)			
Natural rubber	50	40	40
Polybutadiene	20	-	-
SBR 1500	30	-	20
SBR 1013	-	60	40
Soot GPF N660	45	35	85
Aromatic oil	8	8	9
Sulphur	0.25	0.25	0.25

The standard rubber mixture has an impermeability to gas, measured in $\frac{m^2}{S \; P_a} \; 10^{-17}$ which is roughly 8.5 to 8.6 in the temperature region of 30°C.

In the temperature region of 50°C, the impermeability to gas has risen to unfavourable values of roughly 20.8 to 21.0 and, in the temperature region of 70°C, this value is already around 37.0.

In contrast thereto, favourably low values for the impermeability to gas are achieved with Mixture A of the invention; for they are only 3.8 at 30°C, about 10.0.to 10.3 at 50°C and only about 20.4 at 70°C.

Mixture B of the invention likewise has favourably low values for the impermeability to gas; for in this case, they are about 3.6 at 30°C, about 8.9 at 50°C and about 18.1 at 70°C. In this respect, they are actually rather more favourable when compared with the above-mentioned Mixture A.

However, they are clearly an improvement over the above mentioned standard mixture. In this way, the rubber coating of the cover ply ensures that the belt is protected from air and moisture particles penetrating from outside.

CLAIMS

1. A pneumatic vehicle tyre of a radial carcase construction, having a belt-like reinforcing insert and a material cover ply formed from cord or filament elements which are disposed in the circumferential direction, are covered with a vulcanisable rubber mixture and are shrinkable under the effect of heat, characterised in that the rubber mixture for the cover ply is substantially formed from two rubber components, one of which is an emulsion- or solution-polymerised styrene-butadiene copolymer (E-SBR or S-SBR) which makes up at least 20% by weight and which contains at least 30% by weight of bound styrene in the elastomer molecule, and the other rubber component is present as an elastomer which is extremely adhesive.

2. A pneumatic vehicle tyre as claimed in claim 1, wherein two different SBR types are present, one of which is an SBR 1500 having a bound styrene content of 23.5% by weight, and the other is an SBR 1013 having a bound styrene content of 43% by weight.

3. A pneumatic vehicle tyre as claimed in claims 1 and 2, wherein the rubber mixture for the cover ply covers the cord or filament elements, formed from rayon, nylon, polyester, polyamide or aromatic polyamide (aramide), in a symmetrical or asymmetrical manner, and wherein the cover ply is composed of a single layer or a plurality of layers and, in particular, is also present as a strip-like bandage or as a folding ply.

4. A pneumatic vehicle tyre, substantially as hereinbefore described with reference to the accompanying drawing.

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